Wave Function and Energy of the Band Electron in NaCl. II

S/181/60/002/012/017/018
B006/B063

British.

ASSOCIATION: Kafedra teoreticheskoy fiziki Kiyevskogo ordena Lenina gosudarstvennogo universiteta im. T. G. Shevchenko (Department of Theoretical Physics, Kiyev "Order of Lenin" State University imeni T. G. Shevchenko)

SUBMITTED: May 12, 1960

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80029

S/048/60/024/01/07/009
B006/B014

24.7700

AUTHORS: Gorkun, Yu. I., Tolpygo, K. B.

TITLE: Peculiarities of the Motion of Fast Carriers in Polar Crystals

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1960, Vol. 24, No. 1, pp. 94-100

TEXT: The article under review was read at the Second All-Union Conference on the Physics of Dielectrics (Moscow, November 20-27, 1958). Estimations of mobility and carrier concentration on the basis of the results obtained by S. I. Pekar et al. led to the conclusion that the majority carriers of ion crystals are polarons. First, the difficulties are discussed which are encountered in establishing a theory of the effects of polarons. For the development of a consistent theory it is necessary to have a knowledge of the properties of polarons at high velocities and of the motion of polarons. These may be studied by means of a method devised by Bogolyubov and Tyablikov. However, this method contains improper integrals, and in zeroth approximation it corresponds

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to the semiclassical theory of polarons in which the motion of electrons is described in a quantum-mechanical manner, the motion of lattice ions, however, in a classical way. A study of fast polarons makes it necessary to take account of the anharmonic nature of lattice vibrations. Thus, the authors proceeded from Tolpygo's theory (Ref. 3), which describes the dynamics of a crystal lattice consisting of deformed ions. Consideration of the anharmonic nature leads to the occurrence of an additional imaginary term in the resonance denominator of the amplitudes of forced ion oscillations, whereby improper integrals are excluded. It is assumed that the polaron radius is large compared to the lattice constant, that it is possible to calculate in adiabatic approximation, and that the wave function which describes the fluctuation of the electron in the polarization potential well whose center moves with the velocity v, may be represented by the following Schroedinger equation :

$\left[-\frac{\hbar^2}{2m^*}\Delta + U(\vec{r}) - W_0\right]\psi(\vec{r}) = 0.$ $U(\vec{r})$ is given by formula (2). This equation is solved by a variational method using the $\psi_{1,2}$ ansatzes which

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Peculiarities of the Motion of Fast Carriers in Polar Crystals

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are given by (3) and (4). Formula (6) describes the energy lost by a polaron per unit time. Next, some further expressions are derived for different energies, and the course of the functions is diagrammatically shown. The results obtained for the wave function were used to study the dependence of the potential electron energy on the distance along the field direction. Fig. 5 indicates that in the case of uniform motion of a polaron in the field a distortion of the potential well does not lead to a "fallout" of the discrete electron level from the well. V. M. Buymistrov is mentioned in this article. There are 5 figures, 2 tables, and 11 references, 10 of which are Soviet.

ASSOCIATION: Institut fiziki Akademii nauk USSR (Physics Institute of the Academy of Sciences of the UkrSSR)

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TOLPYGO, K.B.

Long-range forces and equations of the dynamics of diamond-type homeopolar crystals. Fiz. tver. tela 3 no. 3:943-956 Mr '61.
(MIRA 14:5)

1. Kafedra teoreticheskoy fiziki Kiyevskogo ordena Lenina gosudarstvennogo universiteta.
(Crystal lattices)

27300

S/181/61/003/008/030/034
B111/B102

24.7500

AUTHORS: Demidenko, Z. A., Kucher, T. I., and Tolpygo, K. B.

TITLE: Eigenfrequencies of lattice vibrations of germanium as calculated in various approximations

PERIODICAL: Fizika tverdogo tela, v. 3, no. 8, 1961, 2482 - 2494

TEXT: A study is made of the natural vibrations of the germanium lattice, taking account of the dipole moments $\mathcal{P}^{l}_{s}$ of electron shells, that appear with a displacement of nuclei. Expressions from Ref. 8(V. S. Mashkevich, K. B. Tolpygo, ZhETF, 32, 520, 1957) and Ref. 12 (FTT, III, no. 3, 1961) are used for the potential energy U of the crystal. Taking account of either short-range forces (zeroth approximation) or the sole linear terms in dipole exchange interaction (first approximation) is insufficient. Calculations are performed in various types of first and second approximations. Experimental data, however, do not allow to prefer one of these variants. It is stated that the third approximation (i. e., taking also nonelectric interactions into account fits reality better than the model

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Eigenfrequencies of lattice...

W. Cochran. The present paper is based upon results of Ref. 12 (K. B. Tolpygo, FTT, III, no. 3, 1961), and its aim is to explain the nature of interatomic forces, and, by comparison between theory and experiments, to calculate all parameters. The natural vibrations of a diamond-type lattice are calculated in various approximations in the first part of the present paper, and formulas are derived for the moduli of elasticity and for the limiting frequencies of optical vibrations. A comparison of results with data obtained from the Raman effect shows that the first approximation is not sufficient to describe the vibrational spectrum in the case of large dipole moments. The matrices of the inner field and the eigenfrequencies are calculated in first approximation in the second part of the paper. By taking account of a possible nonelectric interaction, an attempt is made to improve results of earlier investigations (UFZh I, 226, 1956; ZhETF, 32, 498, 1957; FTT, II, 2655, 1960). A critical study showed that the dipole moments are not small, and that the electron-shell deformation and the interatomic electrostatic forces play an essential part in lattice dynamics. In the third part, the parameters of the equations describing harmonic lattice vibrations are determined, and eigenfrequencies are calculated in second approximation. There are 2 figures, 5 tables, 6 Soviet-bloc and

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Eigenfrequencies of lattice... S/181/61/003/008/030/034
B111/B102

12 non-Soviet-bloc references. The most important reference to English-language publications reads as follows: W. Cochran, Phys. Rev. Lett., 2, 495, 1955; Proc. Roy. Soc., A 253, 260, 1959)

ASSOCIATION: Institut poluprovodnikov AN USSR, Kiyev (Institute of Semiconductors AS UkrSSR, Kiyev)

SUBMITTED: December 22, 1960 (initially)
April 24, 1961 (after revision)

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APPROVED FOR RELEASE: 07/16/2001 CIA-RDP86-00513R001756120003-6"

29680
S/181/61/003/010/002/036
B102/B108

24.7600 (1043, 1137, 1164)

AUTHORS: Gorkun, Yu. I., and Tolpygo, K. B.

TITLE: Theory of transfer effects in p-type Ge-like semiconductors

PERIODICAL: Fizika tverdogo tela, v. 3, no. 10, 1961, 2903-2912

TEXT: The general mathematical procedure (Ref. 7: K. B. Tolpygo. Tr. IFAN USSR, vyp. 3, 52, 1952) to render galvanoelectric, thermoelectric, and magnetic effects as functions of the $\vec{E}$ and $\vec{H}$ fields of the temperature gradients, and of the carrier concentrations is applied to the Hall effects and the magnetic resistivity of p-type semiconductors. The set of kinetic equations is solved for semiconductors with spherical bands that are in contact at $k=0$ (such as p-type Ge, but without taking band corrugation into account). General expressions are derived for the current density $\vec{J}$ and the heat flow $\vec{Q}$ from which the role of band-to-band transitions under the action of a magnetic field may be estimated. Part of the fundamental relations are taken from Ref. 7. The consistent set of Boltzmann equations which are represented as $\vec{\chi}_\alpha + a_\alpha(\vec{H}\times\vec{\chi}_\alpha) - b_\beta\vec{\chi}_\beta = \vec{\chi}_{0\alpha}$, $\alpha \neq \beta$, is solved for light and heavy holes. H. Ehrenreich and A. Overhauser (Phys. Rev. 104, 649, 1956) X

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have solved this set for $H = 0$. Here, it is treated for $H \neq 0$ and $\alpha, \beta = 1, 2$. For the current density $\vec{j}$ the calculations are given in detail.

$$\begin{aligned}\mathbf{j} = \mathbf{j}_n + \mathbf{j}_{1p} + \mathbf{j}_{2p} &= \sigma_0 \mathbf{E} + \mathscr{R}\mathbf{E}\times\mathbf{H} + M\mathbf{H}\times(\mathbf{H}\times\mathbf{E}) + \\ &+ q(D_n\nabla N - D_{1p}\nabla P_1 - D_{2p}\nabla P_2) + \frac{kT}{q}(R_n\nabla N - R_{1p}\nabla P_1 - R_{2p}\nabla P_2)\times\mathbf{H} + \\ &+ \frac{kT}{q}\mathbf{H}\times[\mathbf{H}\times(M_n\nabla N - M_{1p}\nabla P_1 - M_{2p}\nabla P_2)] - U_1\nabla\ln T - \\ &- U_3\nabla\ln T\times\mathbf{H} - U_5\mathbf{H}\times(H\times\nabla\ln T),\end{aligned} \tag{27}$$

with

$$\left.\begin{array}{lll} \mu_n = \frac{4\pi}{3}\frac{q}{kT}K_1^{(4)}, & \mu_{1p} = \frac{4\pi}{3}\frac{q}{kT}(J_1^{(4)} + L_1^{(4)}), & \mu_{2p} = \frac{4\pi}{3}\frac{q}{kT}(L_2^{(4)} + J_2^{(4)}), \\ D_n = \frac{kT}{q}\mu_n, & D_{1p} = \frac{kT}{q}\mu_{1p}, & D_{2p} = \frac{kT}{q}\mu_{2p}, \\ R_n = \frac{4\pi}{3}\frac{q^2}{kT}K_3^{(4)}, & R_{1p} = \frac{4\pi}{3}\frac{q^2}{kT}(J_3^{(4)} + L_3^{(4)}), & R_{2p} = \frac{4\pi}{3}\frac{q^2}{kT}(L_4^{(4)} + J_4^{(4)}), \\ M_n = \frac{4\pi}{3}\frac{q^2}{kT}K_5^{(4)}, & M_{1p} = \frac{4\pi}{3}\frac{q^2}{kT}(J_5^{(4)} + L_5^{(4)}), & M_{2p} = \frac{4\pi}{3}\frac{q^2}{kT}(L_6^{(4)} + J_6^{(4)}), \\ \multicolumn{3}{c}{\sigma_0 = q(\mu_n N + \mu_{1p}P_1 + \mu_{2p}P_2), \quad \mathscr{R} = R_n N + R_{1p}P_1 + R_{2p}P_2,} \\ \multicolumn{3}{c}{M = M_n N + M_{1p}P_1 + M_{2p}P_2,} \end{array}\right\} \tag{28}$$

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$$U_r = q\frac{4\pi}{3}\left\{\left(\frac{3}{2}K_r^{(1)} - \frac{m_n}{2kT}K_r^{(0)}\right)N - \left(\frac{3}{2}J_r^{(1)} - \frac{m_{1p}}{2kT}J_r^{(0)} + \frac{3}{2}L_r^{(1)} - \frac{m_{1p}}{2kT}L_r^{(0)}\right)P_1 - \left(\frac{3}{2}J_{r+1}^{(1)} - \frac{m_{2p}}{2kT}J_{r+1}^{(0)} + \frac{3}{2}L_{r+1}^{(1)} - \frac{m_{2p}}{2kT}L_{r+1}^{(0)}\right)P_2\right\}. \qquad (28)$$

is obtained. For the heat flow, procedure and results are analogous. Hall effect and resistivity change in a homogeneous semiconductor in a magnetic field are considered as examples to demonstrate the application of the general formula which holds for any $\vec{H}$ and may be applied to any transfer process. In order to simplify calculations it is assumed that $\nabla T = 0$ and that effects of concentration changes are negligible. Also the special case of the Hall effect in a weak magnetic field and a thin specimen is treated under the assumption that the hole concentration deviates from its equilibrium value. There are 8 references: 4 Soviet and 4 non-Soviet. The four references to English-language publications read as follows: R. K. Willardson et al. Phys. Rev., 96, 1512, 1954; J. N. Zemel a. R. L. Petritz. Phys. Rev., 110, 1263, 1958; H. Ehrenreich a. A. Overhauser. Phys. Rev., 104, 331, 1956; H. Ehrenreich a. A. Overhauser. Phys. Rev. 104, 649, 1956.

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S/181/61/003/010/002/036
B102/B108

Theory of transfer effects in...

ASSOCIATION: Institut poluprovodnikov AN USSR Kiyev (Institute of Semiconductors AS UkrSSR, Kiyev)

SUBMITTED: March 11, 1961

X

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S/181/61/003/011/030/056
B125/B104

AUTHORS: Demidenko, Z. A., and Tolpygo, K. B.

TITLE: Normal vibrations of alkali-halide crystals with ions of very different dimensions

PERIODICAL: Fizika tverdogo tela, v. 3, no. 11, 1961, 3435-3444

TEXT: Equations for the vibrations of lattices with anions and cations of very different dimensions (e.g., NaI) have to be modified by allowing for the repulsion of I^- ions and by introducing a fractional charge. Thus, agreement between theory and experiment can be improved. The vibrations of binary crystals are described by the system

$$\left.\begin{aligned} \mu_s \Omega^2 p_{sx} &= \sum_{s'y} (A_{ss'xy} p_{s'y} + B_{ss'xy} P_{s'y}), \\ 0 &= \sum_{s'y} (B^*_{s'syx} p_{s'y} + C_{ss'xy} P_{s'y})_{s=1,2}, \end{aligned}\right\} \quad (1)$$

and

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$$
\begin{gathered}
A_{ss'xy} = -\varphi_{ss'xy} + G\delta_{ss'}\delta_{xy} + \delta_{xy}(1-\delta_{ss'}) \times \\
\times [G\cos k_x - 2H(\cos k_y + \cos k_z - 2\cos k_x)], \\
B_{ss'xy} = -\varphi_{ss'xy} - g\delta_{s2}\delta_{s'2}\delta_{xy} - \delta_{s1}\delta_{s'2}\delta_{xy} \times \\
\times [g\cos k_x + 2h(\cos k_y - \cos k_z - 2\cos k_x)], \\
C_{ss'xy} = -\varphi_{ss'xy} + \frac{\delta_{ss'}\delta_{xy}}{A_s}, \\
\Omega^2 = \frac{\mu a^3\omega^2}{e_s^2}, \quad \mu_s = \frac{m_s}{\mu} = \frac{m_s + m_{s'}}{m_{s'}},
\end{gathered}
\tag{2}
$$

for the Fourier coefficients $\vec{p}_s\vec{e}_s\vec{u}_s^1$ and p_s^1 of displacements and electron shells, respectively. Here, A_s = dimensionless polarization, a = distance between neighboring Na^+ and I^- ions, $\varphi_{ss'xy}$ = electric field in the s^1th site, which is induced by the system of dipoles $\vec{p}_{s'}^{1'} = \vec{p}_{s'}e^{ik^{1'}_{s'}}$ and

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Normal vibrations of alkali- ...

depends on the wave vector $\vec{k}$. The parameters G, g, H, and h define the "elastic forces" acting between the nearest neighbors $\vec{p}_1, \vec{p}_2$(G,H) and $\vec{p}_1, \vec{p}_2$(g,h) for longitudinal (G,g) and transverse (H,h) displacements of the quantities $\vec{p}_1$, $\vec{p}_2$, $\vec{P}_2$. Since $C_{12} = C_{44}$, the relations $C_{44} = C_{12} = (e_s^2/a^4)(0.34778 + F + 2\varepsilon)$, $C_{11} = (e_s^2/a^4)\left[(1/2)G - 0.69544 + 2F - 2\varepsilon\right]$; (4) are valid for the temperature applied here. The matrix elements appearing in (2) have to be supplemented by additional terms given by the authors. After elimination of the dipole moments from the second group of (1) the equation for the lattice vibrations read $\mu_s\Omega^2 p_{sx} = \sum_{s'y} \tilde{A}_{ss'xy}p_{s'y}$ (7), from which $-\Omega^2\vec{u}_i + \sum_j Q_{ij}\vec{u}_j = 0$ follows after diagonalization of each square. The extensive expressions for Q_{ij} and $\vec{u}_j$, appearing in the latter relation, are explicitly written. For the acoustic and optical branches one obtains one eigenfrequency each. All coefficients D_{ij} of the transformed matrix C^{-1} are explicitly given in

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Normal vibrations of alkali- ...

an appendix. The eigenfrequencies of the NaI crystal are calculated for three approximations: 1) Short-range forces act only between the nearest Na^+ and I^- ions; 2) allowance is made for the forces acting between the individual I^- ions; 3) in addition, the difference between the ionic charge and e is taken into account. There are 1 figure, 2 tables, and 16 references: 13 Soviet and 3 non-Soviet. The three references to English-language publications read as follows: A. D. B. Woods, W. Cochran, B. N. Brockhase. Phys. Rev., 119, 980, 1960. B. J. Dick, A. W. Overhauser. Phys. Rev., 112, 90, 1958; W. Cochran. Proc. Roy. Soc., A253, 260, 1959. ✓

ASSOCIATION: Institut poluprovodnikov AN USSR Kiyev (Institute of Semiconductors AS UkrSSR, Kiyev)

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TOLPYGO, K.B. [Tolpyho, K.B.]; GORKUN, Yu.I. [Horkun, IU.I.]

Symposium on semiconductors. Ukr. fiz. zhur. 6 no.5:717 S-O '61.
(MIRA 14:11)

(Semiconductors--Congresses)

S/053/61/074/001/003/003
B117/B212

AUTHORS: Rashba, E. I., Tolpygo, K. B.

TITLE: Fourth Conference on the Theory of Semiconductors

PERIODICAL: Uspekhi fizicheskikh nauk, v. 74, no. 1, 1961, 161-175

TEXT: This is a report on the IV Vsesoyuznoye soveshchaniye po teorii poluprovodnikov (4th All-Union Conference on the Theory of Semiconductors) which took place from October 17-22, 1960. This conference had been convened by the komissiya po poluprovodnikam AN SSSR (Comission of Semiconductors AS USSR) in cooperation with the AN Gruz. SSR (AS Gruzinskaya SSR) and Tbilisskiy gosuniversitet im. Stalina (Tbilisi State University imeni Stalin). Over 250 experts and representatives of Soviet 25 cities took part. Over 80 lectures were given and discussed during the general meetings, the section meetings, and the seminars. The chairman of the organizing committee, S. I. Pekar dedicated his address in memory of the late Academian Abram Fedorovich Ioffe. E. L. Andronikashvili, Academian of the AS Gruzinskaya SSR, described the role of A. F. Ioffe, which he had played in creating a large number of Institutes of Physics and Institutes of Physics and Technology in many cities of the

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USSR and also his role in the education of young scientists. K. B. Tolpygo, A. I. Gubanov, G. G. Taluts, V. A. Myamlin, reported on interesting papers of foreign participants read at the International Conference on Semiconductor Physics. This conference took place in Prague from August 28 to September 2, 1960 and about 600 persons from 24 countries took part in it. Most of the papers submitted for discussion dealt with the investigations of optical properties of semiconductors: S. I. Pekar, M. S. Brodin, B. Ye. Tsekava "Optical anisotropy of cubic crystals, additional light waves in crystals, and their experimental identification." R. F. Kazarinov, O. V. Konstantinov: "Doppler shift of absorption lines of excitons." Ye. F. Gross, B. P. Zakharchenya, O. V. Konstantinov: "Inversion effect of a magnetic field in the absorption spectrum of excitons of the CdS crystals." A. A. Demidenko: "Micro-theory of the Frenkel' exciton with and without taking into account the delay in cubic crystals." V. S. Mashkevich: "Electromagnetic waves in a medium having a continuous energy spectrum (taking into account spatial dispersion)." V. L. Strizhevskiy: "Analysis of various properties of dispersion and absorption of light by an exciton in crystals." V. T. Cherepanov and V. S. Galishev: "Anisotropy of quadrupole-type absorption of light by an exciton in cubic crystals." Ye. F. Gross, A. G. Zhilich, B. P. Zakharchenya, A. A.

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Kaplyanskiy: "Effect of a magnetic field and a crystal deformation on the exciton ground state of Cu_2O." S. A. Moskalenko: "The energy spectrum of excitons in non-deformable ion crystals." V. M. Agrynovich: "Theory of excitons in molecule crystals." I. G. Zaslavskaya: "Calculation of the energy of excited exciton states during an intermediate binding." S. V. Vonsovskiy, P. S. Zyryanov, A. N. Petrov, G. G. Taluts: "The effect of electric and magnetic fields on the form of exciton absorption lines." L. E. Gurevich, I. P. Ipatova: "Theory of long-wave absorption of light by crystals." V. M. Agranovich and V. L. Ginzburg: "Dispersion of X-rays in crystals by forming excitons." L. N. Ovander: "Raman effect in crystals." E. I. Adirovich: "The Exciton as a wave for phase transformation." Z. S. Kachlishvili: "Elastic scattering of a non-localized exciton on impurity centers." A. S. Selivanenko: "Calculation of the dispersion cross section of free excitons at lattice defects of a molecule crystal." A. A. Vorob'yev: "Self-absorption and additional absorption in ion crystals and the energy of the lattice." V. M Agranovich, E. I. Rashba, I. B. Levinson, I. M. Lifshits, M. I. Kaganov, V. I. Perel', A. G. Zhilich, S. I. Pekar, S. A. Moskalenko, L. N. Demidenko, V. L. Bonch-Bruyevich took part in the discussion. The following references were quoted: Ref.2: Ye. F. Gross, A. A Kaplyanskiy,
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Fizika tverdogo tela 2, 379 (1960); Ref.3: I. S. Gorban', V. B. Timofeyev, Doklad na XIII Vsesoyuznom soveshchanii po spektroskopii, Leningrad, iyul' 1960 g.; Ref.6: V. M. Buymistrov, S. I. Pekar, ZhETF 32, 1193 (1957); V. M. Buymistrov, Ukr. fiz. zh. 3, Pril. I. 21 (1958). The following papers dealt with the analysis of the band structure of semiconductors: O. V. Kovalev: "Degeneracy of electron energy levels in a crystal." T. I. Kucher: "Hole bands in alkalimetal chlorides." F. M. Gashimzade, V. Ye. Khartsiyev: "Analysis of the energy structure of several semiconductors." Ye. I. Cheglokov, V. A. Chaldyshev: "Symmetry of the solutions for Hartree-Fock equations for crystals." A. Ye. Glauberman, A. M. Muzychuk, M. A. Ruvinskiy, L. V. Stasyuk: "Problems of the multiple-electron theory for solid and liquid semiconductors." A. I. Gubanov: "Various theories of amorphous semiconductors." L. D. Dudkin: "Problems of the chemical bonding of semiconductor compounds of transition metals." A. D. Chevychelov: "Energy spectrum of the elctron for a polymer-chain model." The following persons took part in the discussions: I. B. Levinson, K. B. Tolpygo, N. N. Kristoffel', P. N. Nikiforov, E. I. Rashba, S. I. Pekar, A. Ye. Glauberman, E. L. Nagayev, V. M. Agranovich. The following papers dealt with transfer properties: G. Ye. Pikus, G. L. Bir, E. S. Normantas: "Theory of the deformation

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potential and the dispersion of carriers in semiconductors showing a degenerate band." Ye. P. Pokatilov: "Interaction of free electrons with ultrasonics in silicon and germanium." V. L. Gurevich, Yu. A. Firsov: "Theory of the electrical conductivity of semiconductors in a magnetic field on inelastic scattering." A. I. Ansel'm, B. M. Askerov: "Thermomagnetic phenomena in metalloids exposed to a strong magnetic field." L. E. Gurevich, G.M. Nedlin: "Contribution of electrons to thermal conductivity due to entrainement of phonons." I. Ya. Korenblit: "Galvanomagnetic phenomena in Bi_2Te_3." F. G. Baksht: "Faraday effect at free carriers in Bi_2Te_3 exposed to a weak magnetic field." G. I. Kharus, I. M. Tsidil'kovskiy: "Anisotropy of photomagnetic effects in cubic crystals." N. P. Keklidze: "Several electrophysical properties of germanium and silicon at low temperatures." V. B. Fiks: "Entrainement of ions by electrons in semiconductors." I. M. Dykman, P. M. Tomchuk: "Electrical conductivity and thermionic emission in semiconductors." P. M. Tomchuk: "Variational method for determining the electrical conductivity and taking into account also the Coulomb interaction of carriers." Sh. M. Kogan, V. B. Sandomirskiy: "Theory of the external emission of hot electrons from semiconductors." V. A. Chuyenkov: "Conductivity of germanium in

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in strong electric fields at low temperatures." V. P. Shabanskiy: "Non-equilibrium processes in impurity semiconductors." O. N. Krokhin, Yu. M. Popov: "Slowing-down time of non-equilibrium carriers in semiconductors." The following persons took part in the discussions: V. A. Chuyenkov, G. L. Bir, I. M. Lifshits, G. M. Nedlin, O. V. Konstantinov, M. I. Kaganov, F. G. Bass, V. L. Bonch-Bruyevich, I. M. Dykman, E. I. Rashba, Z. S. Gribnikov. The following papers dealt with resonance and oscillation effects: I. M. Lifshits, V. M. Nabutovskiy, A. A. Slutskin: "Phenomena of the mobility of charged quasi-particles near singular points of isoenergetic surfaces or orbits." M. Ya. Azbel': "A new resonance effect" and "Quasi-classical quantization near particular classical orbits and quanta oscillations of thermodynamic quantities." E. I. Rashba, I. I. Boyko, V. I. Sheka: "Cyclotron and combined resonance and susceptibility of various semiconductors." V. L. Gurevich, V. G. Skobov, Yu. A. Firsov: "Giant oscillations of sound absorption." M. F. Deygen, A. B. Roytsin: "Paramagnetic resonance with arbitrary sizes of a static magnetic field in electrons localized in semiconductors." V. Ya. Zevin: "Theory of the spin-lattice relaxation of electron localization centers in non-metallic crystals." Yu. V. Chkhartishvili: "Electron spin resonance at the F-center in KCl+NaCl crystals." The following persons took part in the discussions: V. L. Bonch-Bruyevich, I. M. Lifshits, K. B.

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Fourth Conference on ...

Tolpygo, V. Ya. Zevin. The following papers were devoted to the theory of local centers and polarons: K. K. Rebane, O. I. Sil'd: "Method of momenta in the theory of electron oscillation transitions." V. M. Buymistrov: "Variational principle for the transitions probability." S. V. Tyablikov, V. A. Moskalenko: "Application of field-theoretical methods to the theory of multiple-phonon transitions." Yu. Ye. Perlin, A. Ye Marinchuk, V. A. Kovarskiy: "Application of the perturbation theory of Wigner-Weißkopf to the problems of electron-phonon interaction in crystals." A. M. Ratner, G. Ye. Zil'berman: "Theory of luminescence of crystals having luminescent impurity centers." A. A. Tsertsavadze: "The mechanism of light absorption by F-centers and excitons in alkali-halide crystals." A. G. Cheban: "Theory of thermal ionization of F'-centers." D. I. Abakarov, Yu. M. Seidov: "Theory of the susceptibility of polaron gas." V. L. Vinetskiy: "The ground state of the bipolaron." R. R. Dogonadze, A. A. Chernenko: "Electrical conductivity of semiconductors with a short length of path of the carriers." The following persons participated in the discussions: K. K. Rebane, E. I. Rashba, N. N. Kristoffel', B. K. Tolpygo, M. I. Kaganov, S. I. Pekar, Yu. Ye. Perlin, A. M. Ratner, M. F. Deygen. Only a few papers dealt with the theory of the crystal lattice: K. B. Tolpygo: "Far-reaching Coulomb forces

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in the dynamics of homeopolar crystals of the diamond type." V. S. Oskotskiy, A. L. Efros: "Theory of crystal lattices having a non-central interatomic interaction." B. Ya. Yurkov: "Theory of the annealing of radiative defects." M. Ya. Dashevskiy, M. S. Mirganovskaya: "The growth and structure of $A^{III}Sb$ monocrystals." The following persons were mentioned: T. I. Kucher and Z. A. Demidenko. The following papers were devoted to the phenomenological theory of semiconductors: I. A Mutrskhulava: "Analysis of local trapping centers by continuous excitation of the semiconductor with light." E. I. Adirovich: "Kinetics of impurity photoconductivity and a new method of determining the effective cross sections of local centers." Yu. V. Gulyayev: "Statistics of electrons and holes in semiconductors showing dislocations." V. M. Fridkin: "Phenomenological theory of the photoelectret state of crystals." G. M. Guro: "Energy structure of a surface layer formed by space charges in semiconductors." Yu. I. Gorkun: "Effect of current electrodes on magnetic resistance." Yu. A. Vdovin, B. M. Grafov, V. A. Myamlin, V. G. Levich: "Properties of the two-phase boundary electrolyte semiconductor." The theory of semiconducter devices was treated in the following papers: V. M. Val'd-Perlov, A. V. Krasilov, M. Ye. Lisogorskiy and V. L. Aronov: "Parametric diodes. Calculation of parameters." D. A. Aronov,

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S/053/61/074/001/003/003
B117/B212

P. S. Karageorgiy-Alkalayev: "A possibility to explain the inverse current increase with increasing potential in a semiconductor diode." M. I. Markovich, N. M. Royzin: " Effect of the geometry of the transistor base on its junction characteristics." A. L. Zakharov: "Theoretical analysis of current-potential characteristics of the injection into the blocking layer." Yu. S. Ryabinkin: "Electric field in semiconductors between junctions according to the type of conductivity" and "Effect of the diffusion of carriers on the transfer coefficient of the pin-field transistor." V. A. Chuyenkov was mentioned. The following persons took part in the discussions: Z. S. Gribnikov and V. B. Sandomirskiy. S. I. Pekar noted in his final speech that great success has been achieved in the research of semiconductors. In the participants'name he thanked the members of the organizing committee from Tbilisi which were under the direction of A. I. Gachechiladze (deceased), for the excellent preparation and organization of the conference. A resolution by the conference noted a strong trend toward centralization of investigations on semiconductor theory in Moscow, Leningrad, and Kiyev, and stressed the need of extending this activity to republic capitals and other cities. It was recommended to hold the next conference in Kishinev in 1962. There are 20 references: 14 Soviet-bloc and 6 non-Soviet-bloc.

Card 9/9

TOLPYGO, K.B.

State of the theory of polarization of ideal ionic and valency crystals. Usp.fiz.nauk 74 no.2:268-288 Je '61. (MIRA 14:6)
(Ionic crystals) (Lattice theory)

TOLPYGO, K. B.

Dissertation defended for the degree of Doctor of Physicomathematical Sciences at the Technical Physics Institute imeni A.F. Ioffe in 1962:

"Selected Problems of the Theory of Nonmetallic Solid State."

Vest. Akad. Nauk SSSR. No. 4, Moscow, 1963, pages 119-145

33349
S/181/62/004/001/018/052
B108/B104

24.7000 (1143,1144,1385)

AUTHORS: Demidenko, Z. A., Kucher, T. I., and Tolpygo, K. B.

TITLE: Frequencies and amplitudes of atomic vibrations in crystals with diamond lattice for a wave vector directed along the cube face diagonals

PERIODICAL: Fizika tverdogo tela, v. 4, no. 1, 1962, 104 - 109

TEXT: On the basis of previous papers (K. B. Tolpygo. FTT, 3, 943, 1961; Z. A. Demidenko et al. FTT, 3, 2482, 1961), the authors calculated the natural frequencies in germanium for the wave vector $\vec{k}$ pointing in the (1; 1; 0) direction. The six dispersion curves, $\omega(\vec{k})$, calculated in four different approximations are somewhat different from one another. The vibrations corresponding to branches 3 and 6 are entirely transverse (TO and TA). The other vibrations are mixed and have a purely longitudinal or transverse character only when $\vec{k} \longrightarrow \{0; 0; 0\}$ or $\{\pi; \pi; 0\}$ (Table 1). There are 1 figure, 3 tables, and 9 references: 4 Soviet and 5 non-Soviet. The four most recent references to English-language publications read as follows: B. N. Brokhouse a. P. K. Iyengar. Phys. Rev., 111, 747, 1958;

X

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33349
S/181/62/004/001/018/052
B108/B104

Frequencies and amplitudes...

W. Chochran. Phys. Rev. Lett., 2, 495, 1959; Proc. Roy. Soc., A253, 260, 1959; Chose et al. Phys. Rev., 113, 49, 1959; B. O. Brokhouse. Phys. Rev. Lett., 2, 256, 1959.

X

ASSOCIATION: Institut poluprovodnikov AN USSR Kiyev (Institute of Semiconductors AS UkrSSR, Kiyev)

SUBMITTED: July 12, 1961

Table 1. Components of $\vec{p}_1$ and $\vec{p}_2$. Legend: (A) branch no; (LO) longitudinal optical vibrations; (TO) transverse optical vibrations; (LA) longitudinal acoustic vibrations; (TA) transverse acoustic vibrations.

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S/181/62/004/005/013/055
B104/B108

24.2700
26.2531

AUTHORS: Tolpygo, K. B., and Chayka, G. Ye.

TITLE: Thermionic emission of ionic semiconductors in strong fields

PERIODICAL: Fizika tverdogo tela, v. 4, no. 5, 1962, 1146 - 1153

JB

TEXT: Thermionic emission of a semiconducting cathode with consideration of the variation in electron concentration and electron temperature under the influence of an external field is calculated in a simple approximation: as in experimental conditions the anode current is assumed to heat the semiconductor. Because of the increased electron concentration and conduction in the surface layer of the semiconductor, heating of the electron gas has little effect on the results in the conventional methods of measuring thermionic emission. Heating of the electron gas has to be considered only in semiconductors with a high electron mobility and if current is very strong. In this case, calculation confirms the results of S. M. Levitin (Tr. Soveshch. po katod. elektron., Kiyev, 1959. Izd. AN USSR, Kiyev, 1952; ZhTF, 23, 1700, 1953; ZhTF, 23, 2159, 1953) who

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S/181/62/004/005/013/055
B104/B108

Thermionic emission of ionic ...

established the existence of a second region of space charge. Besides, this a "stripping" and a rapid increase of the emission current are possible if the anode voltage reaches a given value. There are 3 figures and 1 table.

ASSOCIATION: Kiyevskiy gosudarstvennyy universitet im. T. G. Shevchenko (Kiyev State University imeni T. G. Shevchenko)

SUBMITTED: December 15, 1961

√B

Card 2/2

S/181/62/004/007/009/037
B102/B104

AUTHOR: Tolpygo, K. B.

TITLE: Study of the long-wave vibrations of diamond-type crystals taking account of the long-range forces

PERIODICAL: Fizika tverdogo tela, v. 4, no. 7, 1962, 1765 - 1777

TEXT: In continuation of earlier papers (Mashkevich, Tolpygo, ZhETF, 32, 520, 1957; DAN SSSR, 111, 375, 1956; ZhETF, 32, 866, 1957; 36, 108, 1959; 36, 1736, 1959) and using formulas derived earlier (Tolpygo, FTT, 3, 943, 1961) the author studies the long-wave vibrations of homopolar crystals taking into account the Coulomb interaction of the dipole moments $\mathcal{P}^1_s$ induced in the atomic shells, by the nuclear displacements and short-range forces. Not only the forces acting between the neighboring atoms (which are quadratic in $\mathcal{P}^1_s$) but also the interaction forces between the next neighbors but one are considered. The natural vibration branches (acoustic, optical and light vibrations) are classified. The acoustic vibrations are

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S/181/62/004/007/009/037
B102/B104

Study of the long-wave....

then studied and an explicit formula is derived for the dipole moment of a unit cell induced by them. Dispersion and dipole moment of the optical vibrations and, finally, dispersion of the light vibrations are studied. The electrostatic potential occurring in inhomogeneous lattice deformations (acoustic and optical vibrations) is calculated and the birefringence of light as well as the nature of the additionally occurring light waves caused by spatial dispersion are studied. Though the results agree qualitatively with those obtained in earlier papers, numerical estimations for Si and Ge give different values. There are 1 figure and 1 table.

ASSOCIATION: Kiyevskiy gosudarstvennyy universitet im. T. G. Shevchenko (Kiyev State University imeni T. G. Shevchenko)

SUBMITTED: January 29, 1962

Card 2/2

S/181/62/004/012/041/052
B125/B102

AUTHORS: Yevseyev, Z. Ya., and Tolpygo, K. B.

TITLE: The wave function and the energy of a NaCl crystal incorporating an excess electron

PERIODICAL: Fizika tverdogo tela, v. 4, no. 12, 1962, 3644-3653

TEXT: The method developed by K. B. Tolpygo (UFZh, 2, 242, 1957; FTT, 4, 3644, 1962) for the investigation of crystals incorporating an excess electron is extended to NaCl crystals in the many-electron variant with orthogonalized functions χ_s. Here differing from K. B. Tolpyo (FTT, 4, 3644, 1962), the polarization energy is taken into account in the diagonal matrix elements only. All exchange integrals are calculated directly from the wave functions obtained by D. R. Hartree, W. Hartree (Proc. Roy. Soc. A., 193, 299, 1948). The functions χ_s (which describe the motion of the excess electron in the vicinity of the s-th crystal site) can be completely orthogonalized using the ψ-functions of the inner electrons of the

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S/181/62/004/012/041/052
B125/B102

neighbors. For the matrix elements $H_s = H^{11}_{ss} = \int \Phi^1_s \hat{H} \Phi^1_s \, d\tau$ one obtains

$$\begin{aligned} H_s = A_s^2 \Big\{ & \int \chi_s^l(\rho) \hat{H}_s^l(\rho) \chi_{s'}^{l'}(\rho)\, d\tau - \sum_{s'l'k} |a^{ll'}_{ss'k}|^2 \varepsilon_{s'k} + \\ & + \int \chi_s^l(\rho) \Big[V^l_{s\text{M}}(\rho) - \frac{1}{2} \hat{V}^l_{s\,\text{обм.}}(\rho) \Big] \chi_s^l(\rho)\, d\tau + \\ & + 2 \sum_{s'l'k} \int \chi_s^l(\rho) \Big[V^{l'}_{s'\text{M}}(\rho) - \frac{1}{2} \hat{V}^{l'}_{s'\,\text{обм.}}(\rho) \Big] \psi^{l'}_{s'k} a^{ll'}_{ss'k}\, d\tau + \\ & + \sum_{s'l'k} \int \psi^{l'}_{s'k} \Big[V_{s'\text{M}}(\rho) - \frac{1}{2} \hat{V}^{l'}_{s\,\text{обм.}}(\rho) \Big] \psi^{l'}_{s'k}\, d\tau + V_{s\,\text{полар.}} \end{aligned} \qquad (14)$$

using

$$\left. \begin{aligned} & \int \chi_s^l \hat{H}^{l'}_{s'} \psi^{l'}_{s'k}\, d\tau = -\varepsilon_{s'k} a^{ll'}_{ss'k}, \\ & \int \psi^{l''}_{s''k'} \hat{H}^{l'}_{s'} \psi^{l'}_{s'k}\, d\tau = \varepsilon_{s'k} \delta_{kk'} \delta_{l'l''} \delta_{s's''}. \end{aligned} \right\} \qquad (13).$$

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B125/B102

The wave function and the

After a lengthy calculation $\int \chi_1 \hat{H}_1^1 \chi_1 \, d\tau = 0.1534$ follows from (14) and $H = 0.2322$ when all the components are taken into account. After numerical calculations in elliptic coordinates the values $H_{1,1}^{a\sqrt{2}} = 0.000299$; $H_{22}^{a\sqrt{2}} = -0.005976$ and $H_{12}^{a} = 0.036613$ are obtained from the general formula

$$H^{ll'}_{ss'} = A_s A_{s'} \Big\{ \int \chi^l_s \hat{H} \chi^{l'}_{s'} d\tau + \sum_{s''l''k} a^{l'l''}_{s's''k} \int \chi^{l'}_{s'} \hat{H} \psi^{l''}_{s''k} d\tau + \sum_{s''l''k} a^{l'l''}_{s's''k} \int \chi^{l}_{s} \hat{H} \psi^{l''}_{s''k} d\tau + \sum_{s''l''k} a^{ll''}_{ss''k} a^{l'l''}_{s's''k} \int \psi^{l''}_{s''k} \hat{H} \psi^{l''}_{s''k} d\tau \Big\}, \qquad (18)$$

for the nondiagonal elements (in this formula it is sufficient to sum up over the most adjacent neighbors of the ions at l_s and $l'_{s'}$). V^l_{sM} denotes the Madelung potential. By calculating the nonorthogonality integrals

$$C^{a\sqrt{2}}_{11} = 0.02236; \quad C^{2a}_{11} = 0.00816; \quad C^{a\sqrt{2}}_{22} = 0.00638, \qquad (25)$$
$$C^{a}_{12} = -0.16454; \quad C^{a\sqrt{5}}_{12} = 0.001006.$$

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The wave function and the ...

S/181/62/004/012/041/052
B125/B102

is obtained. After simplifying the formula for the Hamiltonian

$$\bar{H}=\int \Psi^{*}\hat{H}\Psi d\tau=\sum_{s s' l l'} H_{s s'}^{l l'} b_{s}^{l*} b_{s'}^{l'} \quad (4),$$

the coefficients A(k), B(k) and C(k) are expanded in a power series of k (up to k^2 inclusively). The result is $E(k) = 0.04799 + 0.042117\,k^2$. The energy minimum lies in the center of the band E(0) = 1.30 ev and the effective mass $\mu/m = 0.42$ follows from the quadratic term $E(k) = 0.04799 + 0.042117\,k^2$. The band width is found to be ~5.6 ev and the function E(k) is strongly anisotropic. There are 1 figure and 2 tables.

ASSOCIATION: Kiyevskiy gosudarstvennyy universitet im. T. G. Shevchenko (Kiyev State University imeni T. G. Shevchenko)

SUBMITTED: July 16, 1962

Card 4/4

TOLPYGO, K.B.; CHAYKA, G.Ye.

Distortion of the distribution function of electrons in a semiconductor by selection of the thermocurrent and latter's effect on the intensity of the thermionic emission. Fiz. tver. tela 6 no.5:1476-1484 My '64. (MIRA 17:9)

1. Kiyevskiy gosudarstvennyy universitet imeni Shevchenko.

photoconductivity/in semiconductors possessing

Card 1/2

DEMIDENKO, Z.A.; TOLPYGO, K.B.

Dipole moments and some lattice sums in diamond-type crystals.
Fiz. tver. tela 6 no.11:3251-3258 N '64. (MIRA 18:1)

1. Institut poluprovodnikov AN UkrSSR, Kiyev.

APPROVED FOR RELEASE: 07/16/2001 CIA-RDP86-00513R001756120003-6"

APPROVED FOR RELEASE: 07/16/2001 CIA-RDP86-00513R001756120003-6"

DEMIDENKO, Z.A.; TOLPYGO, K.B.

Role of long-range forces in electron scattering by phonons in a homopolar crystal. Fiz. tver. tela 6 no.11:3321-3330 N '64. (MIRA 18:1)

1. Institut poluprovodnikov AN UkrSSR, Kiyev.

DANILOV, V.I.; KRUGLYAK, Yu.A. [Kruhliak, IU.O.]; TOLPYGO, K.B.[Tolpyho, K.B.]; SHRAMKO, O.V.

Statistical analysis of a protein text. Dop. AN URSR no.5:627-630 '65. (MIRA 18:5)

1. Institut fizicheskoy khimii AN UkrSSR.

L 36328-66 EWT(1)/T IJP(c) AT

ACC NR: AP6015782 (A, N) SOURCE CODE: UR/0048/66/030/005/0850/0853

AUTHOR: Tolpygo, K. B.; Chayka, G. Ye. 53

ORG: Kiev State University im. T.G.Shevchenko (Kiyevskiy gosudarstvennyy universitet) B

TITLE: Distortion of the electron distribution function in a semiconductor by the thermionic emission current /Report, Twelfth All-Union Conference on the Physical Bases of Cathode Electronics held in Leningrad 22-26 October 1965/

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 30, no. 5, 1966, 850-853

TOPIC TAGS: thermionic emission, semiconductor crystal, Richardson equation, electron distribution, kinetic equation

ABSTRACT: The authors improve their earlier calculation (Fizika tverdogo tela, 6, 1476 (1964)) of the correction due to the asymmetry of the electron distribution function to the Richardson formula for a semiconductor in order to take into account also the distortion of t e electron energy distribution and the difference between the effective masses of the electron in the semiconductor and in the vacuum. The following three lengths are involved in the problem: the electron mean free path for momentum (direction) change; the electron mean free path for energy change (interaction with the lattice); and the Debye screening distance. These lengths are assumed to differ greatly from each other and to increase in the order in which they are mentioned above.

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L 36328-66

ACC NR: AP6015782

The region of the thermionic emitter near the surface is divided into three zones whose thicknesses correspond to the above-mentioned lengths. The electron wave functions are treated in the effective mass approximation and approximate solutions of the kinetic equation in the different regions are suitably joined at the boundaries. It is concluded that the thermionic current as given by the Richardson formula shoulc be multiplied by the following correction factor: $(m_o/m)(1 + 3m_o/2Km)(1 - M/6Km)^{1/2}(3m_o/2Km))$, where m and m_o are the effective masses of the electron in the crystal and in vacuum, respectively, M is the ratio of kT to the square of the velocity of sound, and K is the ratio of the work function to kT. This formula is valid for large values (>10) of K. Orig. art. has: 8 formulas and 1 figure.

SUB CODE: 20/ SUBM DATE: 00/ ORIG REF: 006/ OTH REF: 000

Card 2/2 *bb*

L 01823-67 EWT(1)/EWT(m)/T/EWP(t)/ETI IJP(c) JD/GG

ACC NR: AP6030955 SOURCE CODE: UR/0181/66/008/009/2587/2593

54
B

AUTHOR: Tolpygo, K. B.; Sheka, D. I.

ORG: Kiev State University im. T. G. Shevchenko (Kiyevskiy gosudarstvennyy universitet)

TITLE: Theory of the intrinsic absorption of light in NaCl-type crystals

21

SOURCE: Fizika tverdogo tela, v. 8, no. 9, 1966, 2587-2593

TOPIC TAGS: light absorption, sodium chloride, intrinsic light absorption, electron bands, trihole band, sodium chloride crystal, refraction index, absorption coefficient, incident light

ABSTRACT: Principles developed earlier by K. B. Tolpygo, D. I. Sheka, and Z. Ya. Yevseyev on electron and tri-hole bands in sodium chloride crystals (Fizika tverdogo tela, 1963, no. 5, pp. 2345 and 2609) were used as a basis for a study of the intrinsic absorption of light related to band-to-band transition. Values obtained on the index of refraction, the coefficient of absorption, and reflection, as a function of the frequency of incident light, were in good agreement with experimental data,

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L 01823-67

ACC NR: AP6030955

both in relation to the shape of the curve and the order of magnitude of the coefficient of refraction. Orig. art. has: 9 formulas, 1 table, and 3 figures. [Authors' abstract] [SP]

SUB CODE: 20/ SUBM DATE: 10Jan66/ ORIG REF: 004/ OTH REF: 002/

Card 2/2 fv

ACC NR: AP6036949 (A,N) SOURCE CODE: UR/0181/66/008/011/3156/3162

AUTHOR: Lyapin, V. G.; Tolpygo, K. B.

ORG: Kiev State University im. T.G. Shevchenko (Kievskiy gosudarstvennyy universitet)

TITLE: Choice of basic functions in the theory of valence bands in diamondlike crystals

SOURCE: Fizika tverdogo tela, v. 8, no. 11, 1966, 3156-3162

TOPIC TAGS: valence band, semiconductor band structure, semiconductor theory

ABSTRACT: The article analyzes the requirements for a choice of basic functions in the many-electron theory of valence bands of diamondlike semiconductors. A theory developed earlier by the authors which predicts the existence of eight doubly spin-degenerated valence bands (neglecting the spin-orbit interaction) is compared with other theories (utilizing the method of strong coupling, or operating with bonding and antibonding equivalent orbitals) which yield only four valence bands. Additional valence bands are obtained by using various space functions (centered on different atoms of the unit cell) for electrons forming σ bonds with opposite spins, which makes it possible to allow for the correlation in their motion. The identity relationships obtained from the proposed theory and tying the energy values at symmetrical points of the Brillouin zone to the cyclotron constants and the lattice constant

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ACC NR: AP6036949

are satisfactorily fulfilled for silicon and germanium. Orig. art. has: 1 table and 10 formulas.

SUB CODE: 20/ SUBM DATE: 10Jan66/ ORIG REF: 004/ OTH REF: 015

Card 2/2

ACC NR: AP7005315 SOURCE CODE: UR/0181/67/009/001/0003/0009

AUTHOR: Yevseyev, Z. Ya.; Tolpygo, K. B.

ORG: Donets Polytechnic Institute (Donetskiy politekhnicheskiy institut)

TITLE: Microscopic theory of F centers in an NaCl crystal

SOURCE: Fizika tverdogo tela, v. 9, no. 1, 1967, 3-9

TOPIC TAGS: color center, sodium chloride, wave function, ground state, crystal vacancy, polaron, electron paramagnetic resonance

ABSTRACT: The authors calculate the energy of the ground state of the F-center electron in an NaCl crystal and the values of the wave functions $|\psi(0)|^2$ at the first three coordination spheres, using a procedure described by one of the authors earlier (Tolpygo, UFZh v. 2, 242, 1957), but with a better choice of bases quasiatomic functions, obtained in an earlier paper by the other author (Yevseyev, FTT v. 5, 2345, 1963). The wave function of excess electron is sought in the form of a linear combination of quasiatomic functions centered relative to the lattice points and orthogonal to the wave functions of the internal electrons and to the wave functions of the surroundings. A value of -5.1 ev is obtained for the energy of the ground state and is used to calculate the energy of thermal dissociation of the F center into a vacancy and a polaron. The value obtained for the dissociation energy (1.915 ev) agrees well with published experimental data. The calculated values of $|\psi(0)|^2$ also agree with the experimental data on the hyperfine splitting of the parmagnetic reso-

ACC NR: AP7005315

nance line, with the exception of the first coordination sphere. The authors thank A. B. Roytsin for consultation on experimental methods for determining $|\psi(0)|^2$. Orig. art. has: 17 formulas and 4 tables.

SUB CODE: 20/ SUBM DATE: 28Mar66/ ORIG REF: 013/ OTH REF: 010

Card 2/2

ZUYEV, V.A. [Zuiev, V.O.]; SACHENKO, A.V.; TOLPYGO, K.B. [Tolpyho,K.B.]

Kinetics of the photoconductivity of thin semiconductor films having trapping and recombination levels. Ukr. fiz.zhur. 10 no. 11:1176-1186 N '65. (MIRA 18:12)

1. Institut poluprovodnikov AN UkrSSR, Kiyev. Submitted Dec. 15, 1964.

L 8300-66 EWT(1)/T/EWA(h) IJP(c) AT

ACC NR: AP5028920 SOURCE CODE: UR/0185/65/010/011/1176/1186

44,55 44,55 44,55 44,55 44,55
AUTHOR: Zuyev, V. O. -- Zuyev, V. A.; Sachenko, A. V.; Tolpyho, K. B. -- Tolpygo, K. B.

44,55 69
ORG: Institute of Semiconductors, AN UkrSSR (Instytut napivprovidnykiv AN UkrSSR) 53

21,44,55
TITLE: Kinetics of photoconductivity of thin semiconductor layers having surface levels of attachment and recombination

SOURCE: Ukrayins'kyy fizychnyy zhurnal, v. 10, no. 11, 1965, 1176-1186

21,44,55
TOPIC TAGS: photoconductivity, semiconductivity, semiconductor carrier, relaxation process

ABSTRACT: An investigation was made of the photoconductivity of a semiconductor of finite thickness having attachment and recombination levels on the surface. A general expression for photoconductivity σ was derived, with the aid of which the dependence of σ on the absorption coefficient and the frequency can be obtained. In deriving σ the following assumptions were made: 1) the impurity semiconductor is of the n-type and its donors are totally ionized. There is no attachment in the volume and the nonequilibrium carriers are characterized by the volume lifetime τ. 2) In the region of volume charge the distribution of carriers is of quasi-Boltzman type. 3) The additional concentration of holes p_1 in the essential region $x \sim (2-3) L_p$ considerably exceeds equilibrium p_0. The cases of sinusoidal, rectangular, and δ-form modulation

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ACC NR: AP5028920

of light were considered. For "thin" specimens ($d < |L_p|$) a time dependence of photoconductivity was obtained in case of П- and δ-modulation. This dependence shows that in a limiting case of a fast exchange of surface levels with bands, the relaxation of photoconductivity is monoexponential. In this case the characteristic time of the photoconductivity decrease is the lifetime of the nonequilibrium carriers. If τ_{eff} is known, the rate of surface recombination S can be determined. When the lifetime of carriers of the levels is considerable, the relaxation of photoconductivity is not monoexponential. For a model with one surface level there are two exponential sections of photoconductivity relaxation. One characterizes the carrier recombination in the volume and on the surface, and the other is linked with the monopolar part of the photoconductivity. The second section can be attributed to the capture of minority carriers of the surface level. Orig. art. has: 3 figures and 36 formulas. [JA]

SUB CODE: 20/ SUBM DATE: 15Dec64/ ORIG REF: 009/ OTH REF: 004/ ATD PRESS: 4149

Card 2/2

L 3146-66 EWT(1) IJP(c)

ACCESSION NR: AP5016049 UR/0368/65/002/005/0447/0460
535.361

44,55

36
B

AUTHORS: Tolpygo, K. B.; Chalyy, A. V. 44,55

TITLE: Structure of a scattering medium of finite thickness from data on multiple scattering electromagnetic radiation 21,44,55

SOURCE: Zhurnal prikladnoy spektroskopii, v. 2, no. 5, 1965, 447-460

TOPIC TAGS: light scattering, electromagnetic wave scattering, multiple scattering, transport equation, distribution function

ABSTRACT: This is a continuation of earlier work (ZhPS v. 1, 1965), in which the radiation transport equation was solved for a semi-infinite scattering medium, and in which information was obtained on the scattering-particle size distribution function from experimental data on multiple scattering of electromagnetic radiation. In the present paper the problem is solved for the case of a scattering medium of finite thickness. The calculation procedure is similar to that of the earlier paper, with allowance for the changed boundary conditions.

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ACCESSION NR: AP5016049

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The particular case of a scattered medium in which the particle dimensions are small compared with the wavelength of the inside radiation is considered in an appendix. Orig. art. has: 54 formulas

ASSOCIATION: None

SUBMITTED: 11May64 ENCL: 00 SUB CODE: OP

NR REF SOV: 003 OTHER: 000

Card 2/2

L 2296-66 EWT(1)/T/EWA(h) IJP(c) AT

ACCESSION NR: AP5014582 UR/0181/65/007/006/1790/1794 54 39 B

AUTHOR: Tolpygo, Ye. I.; 44,55 Tolpygo, K. B.; 44,55 Sheynkman, M. K. 44,55

TITLE: Auger recombination with participation of carriers bound to different centers

SOURCE: Fizika tverdogo tela, v. 7, no. 6, 1965, 1790-1794

TOPIC TAGS: electron recombination, impurity level, semiconductor carrier 21,44,55

ABSTRACT: This is a continuation of earlier work by one of the authors (Sheynkman, FTT v. 7, 28, 1965 and earlier), where the Auger recombination mechanism was proposed for multiply-and singly-charged centers, wherein the capture of a minority carrier is accompanied by the emission into the band of another carrier of opposite sign, localized on the same center. In the present article the authors present a quantum-mechanical calculation of the cross section for the capture of minority carriers by shallow singly-charged neutral particles, when the energy released is transferred to the majority carrier,

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L 2296-66

ACCESSION NR: AP5014582

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which is localized on a neighboring center having the same ionization energy or larger. This carrier is emitted into the nearest band. The capture of carriers by deep centers is also discussed. Numerical estimates show that Auger recombination processes can become comparable with or even larger than radiative and other types of recombination at sufficiently low temperatures and at high impurity concentrations. Values on the order of 10^{-21} — 10^{-22} are obtained for semiconductors of the Ge, Si, or GaAs type in the case of shallow levels, and of the order of 10^{-19} — 10^{-20} for capture by deep levels. This indicates that a capture of a carrier by a shallow center of large radius, with transfer of the energy to a carrier of opposite sign localized on a neighboring deep center, would be most effective. The authors thank E. I. Rashba for valuable critical remarks, and V. Ye. Lashkarev, S. G. Kalashnikov, and V. L. Bonch-Bruyevich for interest in the work and a discussion. Orig. art. has: 1 figures and 5 formulas.

ASSOCIATION: Institut poluprovodnikov AN UkrSSR, Kiev (Institute of Semi-

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L 2296-66

ACCESSION NR: AP5014582

3

conductors AN UkrSSR) 44,55

SUBMITTED: 14Jan65 ENCL: 00 SUB CODE: SS

NR REF SOV: 005 OTHER: 002

Card 3/3 DP

L 2256-55 EWT(1)/T/EWA(h) IJP(c) AT

ACCESSION NR: AP5007687 S/0185/65/010/003/0275/0286 40

44,55 44,55 31 B

AUTHOR: Zuyev, V. O. (Zuyev, V. A.); Savchenko, A. V.; Tolpyho, K. B. (Tolpygo, K. B.)

44,55 21,44,55

TITLE: Kinetics of photoconductivity in semiconductors with minority carrier capture levels on the surface

SOURCE: Ukrayins'kyy fizychnyy zhurnal, v. 10, no. 3, 1965, 275-286

TOPIC TAGS: semiconductor, minority carrier, photoconductivity, capture level, surface state

ABSTRACT: The dependence of photoconductivity on the modulation frequency and on the semiconductor parameters is determined for the case of sinusoidally modulated and strongly absorbed light. Account is taken of the bending of the bands at the surface, due to the existence of several surface levels. It is assumed that capture of minority carriers and adhesion of majority carriers on the surface are possible. The problem is solved in the linear approximation under several simplifying assumptions. The expression obtained is the sum of the bipolar photoconductivity and the monopolar photoconductivity. The contributions of these two

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L 2256-66

ACCESSION NR: AP5007687

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components are different for different bending of the bands and depend on the ratio of the lifetimes of the carriers in the bands and at the surface levels. An analysis of several limiting cases is presented. The nonstationary potoconductivity produced in the case when strongly absorbed light produces carriers of both signs is considered for sinusoidally modulated light, and the dependence of the complex photoconductivity on the frequency of modulation and on the parameters of the semiconductor is determined. The results show that the frequency dependence of the photoconductivity depends appreciably on the ratio between the volume and surface pa[illegible]eters of the semiconductor and can vary in proportion to the frequency raised to negative powers 1/2, 1, 3/2, or 2. The transition from one type of fall-off to the other depends on the semiconductor parameters. It is also shown that, depending on the surface kinetic parameters, carriers of any one polarity can accumulate on this surface. The expressions obtained can be used to interpret photoconductivity-kinetics experiments in which the surface has a strong effect, and also to determine the parameters of the surface centers. "The authors thank Candidates of Physical Mathematical Sciences V. G. Litovchenko and O. V. Snitko for interest in the work." Orig. art. has: 3 figures and 41 formulas.

44,55 44,55

Card 2/3

L 2256-66

ACCESSION NR: AP5007687

3

ASSOCIATION: Instytut napivprovidnykiv AN URSR, Kiev [Institut poluprovodnikov AN UkrSSR] (Institute of Semiconductors, AN UkrSSR)

44,55

SUBMITTED: 28May64

ENCL: 00

SUB CODE: EM,SS

NR REF SOV: 005

OTHER: 002

Card 3/3 dg

DANILOV, V.I.; TOLPYGO, K.B.; SHRAMKO, O.V.

Redundancy and error-resistance of the code of protein synthesis.
Dokl. AN SSSR 163 no.5:1282-1284 Ag '65. (MIRA 18:8)

1. Institut fizicheskoy khimii im. L.V.Pisarzhevskogo AN UkrSSR.
Submitted October 8, 1964.

TOLPYGO, K.B.; CHALYY, A.V.

Structure of a scattering medium of finite thickness on data of multiple scattering of electromagnetic radiation. Zhur. prikl. spektr. 2 no.5:447-460 My '65. (MIRA 18:7)

TOLPYGO, Ye.I.; TOLPYGO, K.B.; SHEYNKMAN, M.K.

Auger recombinations with the participation of carriers bound to various centers. Fiz. tver. tela 7 no.6:1790-1794 Je '65. (MIRA 18:6)

1. Institut poluprovodnikov AN UkrSSR, Kiyev.

ZUYEV, V.A. [Zuiev, V.O.]; SACHENKO, A.V.; TOLPYGO, K.B. [Tolpyho, K.B.]

Kinetics of photoconductivity in semiconductors with the trapping levels for minority current carriers on the surface. Ukr. fiz. zhur. 10 no.3:275-286 Mr '65. (MIRA 18:6)

1. Institut poluprovodnikov AN UkrSSR, Kiyev.

TITLE: Investigation of the structure of a scattering [illegible] [illegible] of electromagnetic radiation

L 38303-65
ACCESSION NR: AP5010046

the radiation transport equation for

TOLPYGO, K.B.; CHAYKA, G.Ye.

Distortion of the electron distribution function in a semiconductor by thermal current separation and its effect on the magnitude of thermionic emission. Radiotekh. i elektron. 10 no.1:199-201 Ja '65. (MIRA 18:2)

1. Kiyevskiy gosudarstvennyy universitet im. T.G. Shevchenko.

DANILOV, V.I.; KRUGLYAK, Yu.A.; TOLPYGO, K.B.; SHRAMKO, O.V.

Correlation between adjacent amino acid radicals in proteins.
Dokl. AN SSSR 160 no.5:1191-1193 F '65. (MIRA 18:2)

1. Institut fizicheskoy khimii im. L.V. Pisarzhevskogo AN UkrSSR.
Submitted June 4, 1964.

S/0181/64/006/004/1158/1166

ACCESSION NR: AP4028446

AUTHORS: Lyapin, V. G.; Tolpy*go, K. B.

TITLE: Investigation of the dispersion law E (k) in the hold bands of diamond type crystals for symmetrical directions

SOURCE: Fizika tverdogo tela, v. 6, no. 4, 1964, 1158-1166

TOPIC TAGS: energy dispersion, hole band, diamond structure, crystal energy, wave function

ABSTRACT: The authors studied the energy of diamond-type crystals with single electrons removed. They sought to obtain a wave function corresponding to those in previous works (K. B. Tolpy*go and A. M. Fedorchenko, ZhETF, 31, 845, 1956; Ye. I. Kaplunova, FTT, 1, 177, 1959) in the form of a linear combination of antisymmetrized products of functions of individual sigma bonds, with an electron being absent at one such bond. In neglecting spin-orbit interaction, the secular equation relative to the energy of the crystal for the directions Δ and Λ of the wave vector is examined. The authors preserve the same matrix elements of the Hamiltonian as Kaplunova but without the assumption of orthogonality of one-electron functions forming the sigma bond. The analytical dependence of E (k) at

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ACCESSION NR: AP4028446

arbitrary values of $|k|$ is found for several energies at the edge of the Brillouin band at the points X_4 and L_3, for germanium and silicon. The agreement with existing data is good. Slight variations are thought to be due to simplifications in the theory: neglect of deeper levels in constructing a function for an atom with a vacancy, and neglect of integrals of nonorthogonality between the more distant orbits and the matrix elements of transition for even more distant neighbors. For greater precision it would be necessary to know the wave functions at great distances from the nucleus, but this would not eliminate the effect of neighbors, and the use of functions of isolated atoms is thus unsystematic. Orig. art. has: 1 figure, 1 table, and 24 formulas.

ASSOCIATION: Kiyevskiy gosudarstvenny*y universitet im. T. G. Shevchenko (Kiev State University)

SUBMITTED: 05Nov63

ENCL: 00

SUB CODE: SS, EC

NO REF SOV: 007

OTHER: 008

Card 2/2

[illegible] moment, electron scattering, crystal [illegible]

[illegible]

[illegible] for the field of a point charge, located in one of the [illegible] determination [illegible]

APPROVED FOR RELEASE: 07/16/2001 CIA-RDP86-00513R001756120003-6"

TOPIC TAGS: silicon, germanium, electron phonon scattering, homopolar crystal

ABSTRACT: An earlier treatment by one of the authors (Tolpy*qo,

APPROVED FOR RELEASE: 07/16/2001 CIA-RDP86-00513R001756120003-6"

ACCESSION NR: AP404[illegible]

KOROL', E.N.; TOLPYGO, K.B.

Characteristics of the dynamics of ZnS type crystal lattices with a mixed ionic-valence bond and fractional variable ion charges. Izv. AN SSSR. Ser. fiz. 28 no.6:942-950 Je '64.

1. Kafedra teoreticheskoy fiziki Kiyevskogo gosudarstvennogo universiteta.

ACCESSION NR: AP4019832 S/0181/64/006/003/0741/0756

AUTHOR: Tolpy*go, K. B.

TITLE: The wave function, normalization integral, and average charge of ions in incompletely polar crystals of the NaCl type

SOURCE: Fizika tverdogo tela, v. 6, no. 3, 1964, 741-756

TOPIC TAGS: wave function, normalization integral, polar crystal, hybrid ion, ionic crystal, binary crystal, ionic charge, cubic crystal, heteropolar crystal

ABSTRACT: The author has examined binary ionic crystals of the NaCl type, which do not differ greatly from strictly heteropolar crystals. His results prove to be rather accurate up to charges of ± 0.5 e, but the generalization for cubic crystals such as CsCl is elementary. He has discussed the concepts of effective and average charges on ions in a crystal. The average charge is determined by the coefficient of linear combination of the wave function of each atom found in a hybrid ion-valence state. The average charges and normalization integrals were computed for electrons of all N_M atoms (where 2M is the total number of atoms in a binary crystal), and also the normalization integrals of N_{M-1} and N_{M-2} for the electron

ACCESSION NR: AP4019832

coordinates of all atoms were computed, except for one or two. These computations were made for the case in which the different wave functions of different atoms entering into antisymmetrized products are not fully orthogonal. The author determined the accuracy of the statistical computations of the values he obtained. He found that the average Hamiltonian of a crystal reduces to the task of finding the intrinsic and mutual energies of individual atoms in their various states. "The author expresses his thanks to N. Kulik and O. Strashko for making a number of computations." Orig. art. has: 2 figures, 3 tables, and 60 formulas.

ASSOCIATION: Institut poluprovodnikov AN UkrSSR, Kiyev (Institute of Semiconductors AN UkrSSR)

SUBMITTED: 14Aug63 DATE ACQ: 31Mar64 ENCL: 00

SUB CODE: SS NO REF SOV: 016 OTHER: 009

Card 2/2

TOLPYGO, K.B. [Tolpyho, K.B.]

Statistical method for calculating the normalization integral and the mean ionic charge in NaCl type crystals deviating from heteropolarity. Ukr. fiz. zhur. 8 no.10: 1050-1063 O '63. (MIRA 17:1)

1. Institut poluprovodnikov AN UkrSSR, Kiyev.

TOLPYGO, K.B.

Wave function, normalization integrals, and mean ion charges on nonpolar NaCl type crystals. Fiz. tver. tela 6 no.3:741-756 Mr '64. (MIRA 17:4)

1. Institut poluprovodnikov AN UkrSSR, Kiyev.

TOLPYGO, K.B.; LEVINSON, I.B.

Fifth All-Union Conference on Semiconductors. Usp. fiz. nauk 81 no.3:557-566 N '63. (MIRA 16:12)

TOLPYGO, K.B.; SHEKA, D.I.

Spin-orbital splitting of hole zones in alkali halide crystals. (MIRA 16:10)
Fiz. tver tela 5 no.9:2609-2619 S '63.

1. Kiyevskiy gosudarstvennyy universitet im. T.G.Shevchenko.

KOROL', E.N.; TOLPYGO, K.B.

Dynamics of ZnS type crystal lattices with fractional variable ion charges. Fiz. tver. tela 5 no.8:2193-2206 Ag '63. (MIRA 16:9)

1. Kiyevskiy gosudarstvennyy universitet im. T.G.Shevchenko.
(Crystal lattices)

TOLPYGO, K. B.

"Theory of Ideal Crystal Lattices."

report submitted for the Conference on Solid State Theory, held in Moscow, December 2-12, 1963, sponsored by the Soviet Academy of Sciences.

APPROVED FOR RELEASE: 07/16/2001 CIA-RDP86-00513R001756120003-6"

ACCESSION NR: AP3012354 S/0185/63/008/010/1050/1063

AUTHOR: Tolpy*go, K. B.

TITLE: Statistical method of calculating the normalization integral and the mean ion charge in crystals of the sodium chloride type which deviate from heteropolarity

SOURCE: Ukrayins'ky*y fizy*chny*y zhurnal, v. 8, no. 10, 1963, 1050-1063

TOPIC TAGS: normalization integral, sodium chloride normalization integral, mean ion charge, sodium chloride mean ion charge, heteropolarity, crystal heteropolarity, heteropolarity deviation, sodium chloride wave function, crystal wave function, crystal ion wave function, sodium chloride ion wave function

ABSTRACT: A statistical method of calculating the normalization integral and the mean charge of ions in an NaCl-type crystal has been made more precise and an evaluation made of its error as related to heteropolarity. The wave function of each lattice point

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ACCESSION NR: AP3012354

is represented as a linear superposition of ionic and atomic wave functions, with linear combination coefficients representing the degree to which the compound is ionic. The crystal function is then an asymmetric product of the wave functions of the various ions. The approximate formulas obtained were compared with exact formulas for the case of a linear atomic chain. For a three-dimensional crystal lattice the estimated precision of the approximate formula (derived form cubic symmetry considerations) indicates that the statistical method may be employed even in the case of a charge of ± 0.5 e for each ion. The author thanks Academician S. I. Pekar of the Ukrainian Academy of Sciences for substantial help in the solution of an unusual problem connected with the work. Orig. art. has: 3 figures, 2 tables and 47 formulas.

ASSOCIATION: none

SUBMITTED: 18Mar63 DATE ACQ: 27Nov63 ENCL: 00

SUB CODE: PH NO REF SOV: 002 OTHER: 000

Card 2/2

L 1671-64 EWT(1)/EWP(q)/EWT(m)/BDS AFFTC/ASD/ESD-3/IJP(C) JD

S/0181/63/005/009/2609/2619

ACCESSION NR: AP3007502

AUTHORS: Tolpy*go, K. B.; Sheka, D. I.

TITLE: Spin-orbital splitting of hole bands in alkali-halide crystals

SOURCE: Fizika tverdogo tela, v. 5, no. 9, 1963, 2609-2619

TOPIC TAGS: spin-orbital splitting, hole, hole band, alkali halide, crystal, K, Cl, wave function, antisymmetry, spin, wave vector, relativistic correction

ABSTRACT: The authors have developed a quantitative theory on hole bands in alkali-halide crystals. Attention is drawn to the interaction of electrons, full consideration being given to the relativistic correction and to correlation of electron movements. In this development they employ wave functions of halide ions (Cl^-) as computed by Hartree, and the wave function of the crystal is constructed from the antisymmetrized products of the wave function ψ^l, describing the state when at the lth anion an electron is missing from one of the layers of the upper (3p) shell. A secular equation of the 6th order is broken into two identical equations, corresponding to the expression for spin, and these are solved for three

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L 1671-64

ACCESSION NR: AP3007502

symmetrical directions of the wave vector $\bar{k}$. Spin-orbital splitting is proved to be fundamental near the center of the band ($\bar{k} = 0$), and minimums of energy are shown for the direction [110]. Near the center of the band, the energy in the lower branches depends but little on the wave vector. The width of the hole band is practically the same as that found without consideration of the relativistic correction. Orig. art. has: 3 figures, 1 table, and 25 formulas.

ASSOCIATION: Kiyevskiy gosudarstvenny*y universitet im. T. G. Shevchenko (Kiev State University)

SUBMITTED: 22Apr63 DATE ACQ: 14Oct63 ENCL: 00

SUB CODE: PH NO REF SOV: 006 OTHER: 003

Card 2/2

L 19160-63 EWT(1)/EWP(q)/EWT(m)/EWP(b)/BDS AFFTC/ASD/IJP(C) JD/JG
ACCESSION NR: AP3005326 S/0181/63/005/008/2193/2206
62
61

AUTHORS: Korol', E. N.; Tolpy*go, K. B.

TITLE: Dynamics of crystalline lattices of the type ZnS with fractional variable charges on the ions

SOURCE: Fizika tverdogo tela, v. 5, no. 8, 1963, 2193-2206

TOPIC TAGS: crystalline lattice, fractional charge, ion, Zn, S, In, Sb, potential energy, lattice vibration, valence electron, atom, homopolar crystal, adiabatic approximation, Sigma bond, electrical field, nucleus

ABSTRACT: An expression for potential energy and an equation for vibration of a ZnS-type lattice have been derived on the assumption that in equilibrium valence electrons are so disposed between atoms that each has a fractional average charge. The authors generalize the computations of potential energy (found in a number of papers) for ions and homopolar crystals on the basis of adiabatic approximation. It is stated that each pair of electrons connecting two neighboring atoms may belong, with a certain probability, to each atom or they may form a Sigma bond. When the nucleus is displaced, and also when there is an electrical field, these

Card 1/2

L 19160-63
ACCESSION NR: AP3005326

probabilities change, and this leads to a change in the average charge of the atoms. Orig. art. has: 43 formulas.

ASSOCIATION: Kiyevskiy gosudarstvenny*y universitet im. T. G. Shevchenko (Kiev State University)

SUBMITTED: 11Mar63 DATE ACQ: 06Sep63 ENCL: 00

SUB CODE: PH NO REF SOV: 012 OTHER: 004

Card 2/2

3

Characteristics of the dynamics of crystal lattices of the ZnS type for compounds with mixed ionic-valence bonding and varying atomic charges. K. B. Tolpygo, E.-H. Korol' (15 minutes).

Relation of the electrical properties of Sb_2Se_3 with the crystallo-chemical composition and zone structure. A. S. Karpus, I. V. Batarunas (10 minutes).

Report presented at the 3rd National Conference on Semiconductor Compounds, Kishinev, 16-21 Sept 1963

TOLPYGO, K.B.; KRISTOFFEL, N., red.

[Theory of vibrations of crystal lattices with deformed atoms] Teorii kolebanii kristallicheskikh reshetok s deformiruemymi atomami; lektsii, prochitannye v letnei shkole po teorii tverdogo tela. Tartu-Tyravere, iiun' 1961. Tartuskii gos. unov. Vol.2. 1962. 17 p. (MIRA 16:4)
(Crystal lattices--Vibration) (Dislocation in crystals)

TOLPYGO, K.B.

Long-wave vibrations of diamond-type crystals taking long-range forces into account. Fiz.tver.tela 4 no.7:1765-1777 Jl '62. (MIRA 16:6)

1. Kiyevskiy gosudarstvennyy universitet imeni T.G.Shevchenko. (Crystals--Vibration)

MURMILO, G.L. [Murmylo, H.L.]; TOLPYGO, K.B.

Wave function and energy of band electrons in NaCl. Part 3. Use of orthogonal functions. Ukr. fiz. zhur. 8 no.1:42-56 Ja '63. (MIRA 16:5)

1. Kiyevskiy gosudarstvennyy universitet im. Shevchenko.
(Functions, Orthogonal) (Wave mechanics)

VOROB'YEV, A.A., doktor fiziko-matematicheskikh nauk, prof.; BORISOV, R.I., kand.tekhn.nauk, dotsent; TOLPYGO, O.B., kand.tekhn.nauk, dotsent; KALYATSKIY, I.I.

"High-voltage engineering," Part.3, No.1: "Wave processes and internal overvoltages in electrical systems" by L.I. Sirotinskii. Reviewed by A.A. Vorob'ev and others. Elektrichestvo no.5:89-90 My '61. (MIRA 14:9)
(Electric power distribution—High tension)
(Sirotinskii, L.I.)